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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,932	10/22/2003	Joonbae Park	GCTS-0039	4014

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MUIR PATENT CONSULTING, PLLC
758 WALKER ROAD
SUITE C
GREAT FALLS, VA 22066

EXAMINER	
CHEN, JUNPENG	

ART UNIT	PAPER NUMBER
2618	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/689,932	PARK ET AL.	
	Examiner	Art Unit	
	JUNPENG CHEN	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 January 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-16,21-23 and 25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-16,21-23 and 25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to applicant's amendment/arguments filed on 10/05/2007. Claims 1, 2, 6-9 and 13-16 have been amended. Claims 5 17-20 and 24 have been cancelled. Currently, claims 1-4, 6-16, 21-23 and 25 are pending. **This action is made FINAL**.

Response to Arguments/Amendments

2. Applicant's arguments/amendments with respect to amended claims 1 and 14 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4, 6-16, 21-23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Paulus** et al. (U.S. Patent 7,024,221) in view of **Jensen** et al. (U.S. Patent 6,907,089 B2), and in further view of **Darabi** (U.S. PGPub 2003/0067359 A1).

Consider **claim 1**, Paulus discloses a low-intermediate frequency (IF) radio receiver (read as RF receiver, Figure 8, line 39 of column 14 to line 37 of column 18) comprising:

a first analog front-end down-conversion mixer to down convert an RF signal from a first low noise amplifier (LNA) into respective low-IF I and Q signals (read as the down converter circuitry 409, Figure 8);

an analog gain stage serially coupled to said first analog down-conversion mixer (read as amplifiers 833A and 833B, Figure 8)

a second down-conversion mixer to convert said low-IF I and Q signals into a base-band signal with desired signal centered at DC, said second down-conversion mixer to translate a DC offset in frequency domain to a frequency, said translated DC offset located at the same frequency of a second LO frequency (read as the digital down converter circuitry 427, Figure 8, lines 23-33 of column 16); and

a notch filter coupled to said second down-conversion mixer to reduce said translated DC offset (read as digital filter circuit 436, Figures 8, 17A and 17B, line 50 of column 31 to line 62 of column 32).

However, Paulus does not specifically disclose the DC offset in frequency domain is translated to a frequency higher than the desired signal.

Nonetheless, in related art, Jensen discloses a similar receiver, comprising a IF signal having a frequency of 2 MHz, which is greater than the channel width (1MHz for Bluetooth) , Figure 1, lines 1-10 of column 4.

Therefore, it would have been obvious for a person with ordinary skill in the art at the time the invention was made to incorporate the teachings of Jensen into the teachings of Paulus for the purpose of reducing the distortion.

Nonetheless, Paulus, as modified by Jensen, discloses the claimed invention above but does not discloses an analog filtering stage coupled to the analog gain stage to partially reject out of band signals and to block noise from propagating into a following stage; and that the second down-conversion mixer and the notch filter are analog and therefore having an analog-to-digital converter coupled to an output of said

analog notch filter, wherein said low-IF analog radio receiver is configured to use full-analog channel selection and filtering.

Nonetheless, in related art, Darabi discloses a receiver circuit having DC offset controlling function ([par 0101]), which having a BPF serially coupled to amplifiers 28 first stage mixer 24 to filter unwanted signal, and having an analogy second stage mixer 30 outputs signal to analog filter 32, the output of the analog filter 32 is being converted by A/D converter 34 for further processing, which allows the radio receiver 10 to use full-analog channel selection and filtering, Figure 2, par [0086]-[0091].

Therefore, it would have been obvious for a person with ordinary skill in the art at the time the invention was made to incorporate teachings of Darabi into the teachings of Paulus, which modified by Jensen, for the purpose of programming the gain of the signal with amplifier, also, digital filter is more expensive than an equivalent analog filter due to their increased complexity and that analog filter does not experience latency like digital filter does.

Consider **claims 2 and 3, as applied to claim 1 above**, Paulus, as modified by Jensen and Darabi, discloses wherein the first analog front end down-conversion mixer is a quadrature mixer performs a down-conversion of the RF signal and the quadrature mixer matches phase and gain in the I/Q signal as in claim 2, and wherein the phase and gain are matched to achieve an amount of image rejection as in claim 3 (read as the down converter circuitry 409 provides better image rejection, Figure 8, lines 35-49 of column 15).

Consider **claim 4, as applied to claim 3 above**, Paulus, as modified by Jensen and Darabi, discloses the claimed invention above but does not specifically disclose wherein the amount of image rejection is about 40 dB.

However, the Examiner takes Office Notice of the fact that in GSM standard, the required amount of image rejection is around 40dB.

Therefore, it would have been obvious for a person with ordinary skill in the art at the time invention was made to make sure the amount of image rejection is about 40 dB so the receiver can be used in GSM.

Consider **claim 6, as applied to claim 1 above**, Paulus, as modified by Jensen and Darabi, discloses an analog-to-digital converter coupled to an output of said notch filter, wherein a frequency of said second LO signal is not less than a channel width of said analog radio receiver (read as A/D converter 34 and frequency of the IF signal is greater than the desired signal in frequency domain, Figure 2, paragraph [0091] of Darabi).

Consider **claim 7, as applied to claim 1 above**, Paulus, as modified by Jensen and Darabi, discloses wherein the second analog mixer translates a static or dynamic DC offset in frequency domain, resulting in a carrier leakage and the carrier leakage is located at the same frequency of the second LO frequency (read as the intermediate frequency is converted to baseband centered at zero frequency or DC, that means the second LO frequency is the frequency of the IF signal, because of this, the DC offset after the down converter circuitry 427 is at the same frequency of the second LO frequency in frequency domain, Figure 8, lines 23-33 of column 16).

Consider **claim 8, as applied to claim 6 above**, Paulus, as modified by Jensen and Darabi, discloses wherein one analog gain stage and one analog filtering stage are coupled to an output of each of said first and second analog down-conversion mixer is used to block noise from being input into the following stage (read as the analog gain stages and analog filtering stages after the mixers).

Consider **claim 9, as applied to claim 6 above**, Paulus, as modified by Jensen and Darabi, discloses wherein a analog notch filter is used to eliminate a carrier leakage caused by static or dynamic DC-offset (read as filter circuit 436 analog fashion, Figures 8, 17A and 17B, line 50 of column 31 to line 62 of column 32).

Consider **claim 10**, **as applied to claim 9 above**, Paulus, as modified by Jensen and Darabi, discloses wherein the notch filter includes at least one of an elliptic filter and a chebyschef-II type filter (read as IIR-type filter, figures 30A-30c).

Consider **claim 11, as applied to claim 1 above**, Paulus, as modified by Jensen and Darabi, discloses first LO signal is generated using a phase locked loop (PLL) circuit (read as PLL 222, Figure 8), but does not specifically discloses the a second LO signal are generated using a phase locked loop circuit.

Nonetheless, Jensen further discloses a second LO signal is generated by a direct digital frequency synthesizer 160 (DDFS), Figure 6, lines 10-21 of column 7.

Therefore, it would have been obvious for a person with ordinary skill in the art at the time the invention was made to further incorporate the teachings of Jensen into the

teachings of Paulus, which modified by Jensen and Darabi, because DDFS has the advantage of fast continuous-phase switching response.

Consider **claim 12, as applied to claim 11 above**, Paulus, as modified by Jensen and Darabi, discloses wherein the second LO signal is generated using a direct digital frequency synthesizer (DDFS) or a divided reference clock input with filtering to reject harmonic signals (read as the DDFS above).

Consider **claim 13, as applied to claim 11 above**, Paulus, as modified by Jensen and Darabi, discloses the digital down converter circuitry 427 comprises : an analog third mixer coupled to receive intermediate frequency I signals, from said first mixer and a second LO I signal; an analog fourth mixer coupled to receive said intermediate frequency I signals from said first mixer and a second LO Q signal; an analog fifth mixer coupled to receive said intermediate frequency I signals from said first mixer and a second LO Q signal; an analog sixth mixer coupled to receive said intermediate frequency I signals from said first mixer and a second LO I signal; a first logic circuit to combine the output of the third and fifth mixer; and a second logic circuit to combine the output of the fourth and sixth mixer (read as the mixer in Figure 20A).

Consider **claim 14**, Paulus discloses a radio receiving method (read as RF receiver, Figure 8, line 39 of column 14 to line 37 of column 18) comprising:

using a first analog filter front-end down-conversion mixing to down-convert an RF signal from a first low noise amplifier (LNA) into respective intermediate frequency I and Q signals (read as the down converter circuitry 409, Figure 8);

using a second down-conversion mixing to down-convert said intermediate frequency signals to obtain an output signal with a desired signal that is centered at DC (read as the digital down converter circuitry 427, Figure 8, lines 23-33 of column 16)

local filtering said output signal at said second LO frequency to suppress said carrier leakage, wherein an analog notch filter is used to suppress the carrier leakage signal to a prescribed level (read as digital filter circuit 436, Figures 8, 17A and 17B, line 50 of column 31 to line 62 of column 32),

wherein a first LO signal is very high frequency close to the incoming carrier signal and a second LO signal is close to DC and the receiving method becomes a low-IF radio receiving method (read as the LO signals going to the first and second down-converting stages).

However, Paulus does not specifically disclose translate a DC-offset to a carrier leakage signal at a second LO frequency not less than a channel width.

Nonetheless, in related art, Jensen discloses a similar receiver, comprising a IF signal having a frequency of 2 MHz, which is greater than the channel width (1MHz for Bluetooth) , Figure 1, lines 1-10 of column 4.

Therefore, it would have been obvious for a person with ordinary skill in the art at the time the invention was made to incorporate the teachings of Jensen into the teachings of Paulus for the purpose of reducing the distortion.

Nonetheless, Paulus, as modified by Jensen, discloses the claimed invention above but does not discloses that the second down-conversion mixer and the notch

filter are analog and therefore having an analog-to-digital converter coupled to an output of said analog notch filter, wherein said low-IF analog radio receiver is configured to use full-analog channel selection and filtering.

Nonetheless, in related art, Darabi discloses a receiver circuit having DC offset controlling function ([par 0101]), which having a BPF serially coupled to amplifiers 28 first stage mixer 24 to filter unwanted signal, and having an analogy second stage mixer 30 outputs signal to analog filter 32, the output of the analog filter 32 is being converted by A/D converter 34 for further processing, which allows the radio receiver 10 to use full-analog channel selection and filtering, Figure 2, par [0086]-[0091].

Therefore, it would have been obvious for a person with ordinary skill in the art at the time the invention was made to incorporate teachings of Darabi into the teachings of Paulus, which modified by Jensen, as digital filter is more expensive than an equivalent analog filter due to their increased complexity and that analog filter does not experience latency like digital filter does.

Consider **claim 15, as applied to claim 14 above**, Paulus, as modified by Jensen and Darabi, discloses wherein an analog gain stage and an analog filtering stage are used to partially reject out-of bands and to block noise from propagating into a following stage after each first and second analog down-conversion mixer (read as the analog gain stages and analog filtering stages after the mixers).

Consider **claim 16, as applied to claim 14 above**, Paulus, as modified by Jensen and Darabi, discloses wherein a second analog down-conversion mixer

converts a low-IF signal into a base-band signal (read as the second stage down-converter).

Consider **claim 21, as applied to claim 14 above**, Paulus, as modified by Jensen and Darabi, discloses the claimed invention but does not specifically disclose wherein harmonics of the second LO signal are designed with a spectral purity to achieve an acceptable signal-to-noise ratio (SNR).

Nonetheless, the Examiner takes Office Notice of the fact that it is well known in the art that receiver are designed to obtain acceptable SNR.

Therefore, it would have been obvious for a person with ordinary skill in the art at the time the invention was made to generate a second LO signal with its harmonic with a spectral purity to increase the SNR to a desired level.

Consider claim **22, as applied to claim 21 above**, Paulus, as modified by Jensen and Darabi, discloses wherein a frequency sum of a first LO signal and the second LO signal is the same as the desired RF signal frequency from the antenna (read as the with the first and second LO signals to the first and second stage of mixers, the baseband signal is centered at DC).

Consider claim **23, as applied to claim 21 above**, Paulus, as modified by Jensen and Darabi, discloses wherein a frequency of a first LO signal is the same as a frequency of the second LO signal (read as the LO signals to the first and second down-converting stages).

Consider **claim 25, as applied to claim 6 above**, Paulus, as modified by Jensen and Darabi, discloses wherein the frequency of the second LO signal is selected by balancing an increase to reduce image rejection and a decrease to reduce transient response time (read as the combination of Jensen, Paulus and Darabi disclose the claimed circuit structures for performing the same claimed functionality, therefore, the claimed feature of the second LO signal is inherently existing).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any response to this Office Action should be **faxed to** (571) 273-8300 **or mailed to**:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junpeng Chen whose telephone number is (571) 270-1112. The examiner can normally be reached on Monday - Thursday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Junpeng Chen
J.C./jc

/Edward Urban/

Supervisory Patent Examiner, Art Unit 2618